

Wen Hong, Ph.D.

nikkihong@outlook.com | (424)626-0873

Education

Shanghai Jiao Tong University, Shanghai, China	09/01/2016 – 06/30/2022
<i>Ph.D. in Electrical Engineering Supervisor (PI): Professor Jingquan Liu</i>	
<i>Research Topic: Flexible and implantable MEMS device</i>	
Jilin University, Changchun, China	09/01/2012 – 06/30/2016
<i>Bachelor of Science in Mechanical Engineering</i>	

Working Experience

Stanford University, Palo Alto, California, United States	03/13/2025 – 03/12/2027
Postdoc in Ophthalmology Supervisor (PI): Dr. Charles DeBoer	
Research topic: Biodevice	
University of California, Los Angeles, California, United States	03/13/2023 – 03/12/2025
Postdoc in Material Science and Engineering Supervisor (PI): Professor Ximin He	
Research Topic: 3D printing of metals, hydrogels and liquid metal	

Academic Experience

- **High resolution light-based 3D printing of biogel and metals**
 - **Digital Light Processing (DLP)**-based liquid metal printing, hydrogel printing and metal printing
 - * Prepared different photo-initiated solutions for metal/liquid metal/hydrogel printing;
 - * Built set-ups of different kinds of laser-based printing system with **Matlab coding** control;
 - * Tested and processed of the mechanical property of the printed gels, which includes strain-stress, modulus, stretchability;
 - * **Characterization** of the samples, including **optical microscope, SEM, XRD, FTIR and NMR**;
- **Self-adaptive cardiac optogenetics for ventricular tachycardia based on negative stretching-resistive strain sensor**
 - Investigation of a negative stretching-resistive material followed by its application in cardiac optogenetics system. In-vivo results with closed-loop and self-adaptive control were demonstrated.
 - * Explored a negative stretching-resistive conductive composite based on carbon nanotubes and natural latex. Successfully demonstrated decreasing of resistance with strain increase;
 - * Developed the **theoretical modeling** of the conductive composites involving its conductive features and resistive properties;
 - * **Characterization and testing** of the conductive composites with **LCR meter, SEM, TEM, AFM, and XRD**;
 - * **Built a prototype of a self-adaptive cardiac system**, which includes electrocardiogram (ECG) **electrode sensors, LED stimulators and circuit board controllers** based on the proposed negative stretching-resistive strain sensor;
 - * Validated the cardiac optogenetics system with **animal experiments** in National Key hospital labs with protocols by **collaborating with doctors**.
- **Multifunctional flexible and stretchable sensor array enabled cryoballoon for atrial fibrillation**
 - Developed a flexible and stretchable system including Au electrodes and Pt temperature sensors.
 - * Theoretical study on stretchable materials contractures principles;
 - * Process development of the material, including **CVD, PVD, wet etching, RIE, lithography and sacrificial process**;
 - * **Simulation** of the flexible and stretchable device with multi-physics coupled field FEM using **Abaqus and Comsol**;
 - * Developed a cryoablation testing platform with off-the-shelf components includes catheter, cryo generation, closed loop thermal control, etc.
- **Ultraminiature and flexible sensor based on interior cornerflow for biofluids direct pressure sensing (both resistive and capacitive sensors)**

- Developed an approach to achieve liquid-gas balance in Parylene cavity to measure the liquid pressure.
 - * **Modeling of the capillary force** based on gas-liquid-solid phase principles;
 - * Process development to achieve right lithography angle and lithography gap for interior corner flow;
 - * Developed the ideal interior corner flow (capillary liquid column) and bubble generation condition with capillary force control on Parylene and **well-defined lithography conditions**;
 - * Modeling development of the resistance and capacitance with reference to the design of the Parylene cavity;
 - * Tested the resistive-type and capacitive-type pressure sensor by LCR meter, in a shell structure with controlled liquid pressure.
- **Spontaneous liquid spreading realized by 1-D and 2-D microstructure mimicking nepenthes**
- * Modeling of the thin film surface energy for the hydrophilic/hydrophobic and contact angle features;
 - * Developed a nepenthes-inspired biomimetic structure for mono-direction flow;
 - * Design and fabricated various shapes of Parylene-based structures with surface micromachining process to control mono- or bi-directional flow and water-oil separation.

Hardware & Software Skills

Cleanroom Fabrication Techniques: 5 years hands-on experience in SJTU Microelectronics Research Center. Capable of whole

CMOS/MEMS process, including: CVD/PVD processes, All kinds of furnaces, Dry/Wet Etching, Optical/E-beam Litho, etc

Semiconductor Failure Analysis: Validation and failure analysis with FIM, SEM, EDS, FTIR and TEM.

Control and Instrumentation: PSPICE, LabVIEW, Arduino, etc.

Programming: C, MathCAD, Python, MATLAB (Simulink, Fourier optics, nonlinear numerical methods, control system, signal processing), G code and others.

CAD & Layout: Solidworks, AutoCAD, Catia.

Finite element Analysis (FEA): ANSYS, COMSOL, Abaqus.

Select Publications

Full list: <http://bit.ly/3we8oVy>

- [1] Hong, Wen, et al, "Self-adaptive cardiac optogenetics device based on negative stretching resistive strain sensor", **Science Advances**, (2021): abj4237. doi: 10.1126/sciadv.abj4273.
- [2] Hong, Wen, et al, "Multi-functional sensor array on the cryoablation balloon for atrial fibrillation", **Sensors and Actuators A: Physical**, (2022): 113605. doi: 10.1016/j.sna.2022.113605.
- [3] Hong, Wen, et al, "A Super Anisotropic Wetting Microstructure Based on Combination of Sharp Edge and Sharp Corner", **Journal of Microelectromechanical Systems**, (2019): 1055-1059. doi:10.1109/JMEMS.2019.2933725.
- [4] Tang, Longjun, Hong, Wen, et al, "Ultraminiature and flexible sensor based on interior corner flow for direct pressure sensing in biofluids", **Small**, (2019): 1900950. doi:10.1002/sml.201900950.
- [5] Zhan, Yinjin, Hong, Wen, et al, "Flexible multi-positional microsensors for cryoablation temperature monitoring," **IEEE Electron Device Letters**, (2019): 1674-1677. doi:10.1109/LED.2019.2934864.
- [6] Xu, Mengfei, Hong, Wen, et al, "Multifunctional Microelectrode for Low-Voltage Pulsed Field Ablation in Atrial Fibrillation" **IEEE Electron Device Letters**, (2022): 1965-1968.

Conference Presentations

- [6] Hong, Wen, et al, "An ultraminiature and flexible pressure sensor based on electrical-double-layer capacitance for catheter-tip applications", In 2018 IEEE Micro Electro Mechanical Systems (MEMS), 451-454. *IEEE*, 2018.
- [7] Hong, Wen, et al, "A Novel SESC Microstructure to Realize Various Spontaneously Liquid Spreading Properties", In 2019 IEEE Micro Electro Mechanical Systems (MEMS), 400-403. *IEEE*, 2019